US Army Corps of Engineers®
Engineer Research and Development Center

Service

Assistance in HVAC Commissioning of Standard Buildings on Military Installations

Description

The Construction Engineering Research Laboratory (CERL) offers engineering services on a reimbursable basis to consult on (or to perform) commissioning, recommissioning, and retrocommissioning of heating, ventilating, and air conditioning (HVAC) systems in standard buildings (or other facilities) on military installations. Such buildings would include, for example, Headquarters [HQ] office buildings, barracks, maintenance and repair shops, etc. CERL also provides commissioning training through Proponent Sponsored Engineer Corps Training (PROSPECT) courses:

- Course 35TAB01A, "HVAC Systems: Testing, Adjusting, & Balancing – QV"
- Course 35MSC01A, "HVAC Systems Commissioning."

Commissioning (Cx) is a systematic process of verifying and documenting that building energy systems or subsystems perform interactively according to the design intent and the owner's operational needs. Recommissioning (ReCx) involves "tuning up" an existing energy system to improve its performance, so that, ideally, the system functions "like new." Retrocommissioning is essentially the same process as recommissioning, but applied to buildings that have never gone through any formal type of commissioning or quality assurance process. Performing or specifying Cx/ReCx work is a complex process. Installation Directorates of Public Works (DPWs) can prepare for and reduce the cost of Cx/ReCx by securing specific training or expert consultation, or in some cases, by contracting the activity to area experts.

Capabilities

CERL can provide the tools, documentation, and expertise to ensure successful building HVAC systems commissioning. CERL has developed acceptance testing procedures for U.S. Army Corps of Engineers Districts and Resident/ Area Offices to verify that HVAC systems operate as designed.

Two standard Fort Campbell buildings commissioned by CERL researchers.

These quick and easy commissioning procedures were specifically designed for Corps quality assurance (QA) personnel to test HVAC system components for efficiency. CERL periodically participates in formal review and revision of Corps of Engineers Unified Facilities Guide Specifications (UFGS) 15895, *Air Supply and Distribution System for Air-Conditioning System* (January 2005), 15995A, *Commissioning of HVAC Systems* (July 2003), 15990A, *Testing, Adjusting, and Balancing of HVAC Systems* (November 2004), 15951, *Direct Digital Control for HVAC and Other Local Building Systems* (May 2005), and 13801, *Utility Monitoring and Control Systems (UMCS)* (August 2004), all of which specify or support the requirements for the commissioning procedures. CERL experts also offer assistance in any part of the commissioning process by developing, reviewing, and/or implementing commissioning plans and procedures.

Supporting Technology

The CERL-developed and documented acceptance testing procedures can ensure that all major components of air supply and distribution systems comply with the requirements of UFGS 15895. Additional acceptance test procedures have been developed for variable air volume systems, boilers, chillers, hydronic systems, and exhaust systems. CERL has also produced a training videotape that illustrates this procedure (which may be requested from the listed ERDC POC).

The procedures guide QA personnel in systematically measuring, analyzing, and documenting several critical energy, flow, pressure, and temperature parameters using adaptations of standard testing, adjusting, and balancing (TAB) trade procedures. Test results and data are recorded on checklists and worksheets. These data can be compared with expected values from design calculations and TAB reports to ensure that the system was installed correctly and is operating properly. Only conventional TAB instruments (manometer, pitot tube, volt-ammeter, tachometer, flow hood, thermometer, differential pressure gauge) are required to perform the tests.

CERL has also authored the *Commissionpedia* tool — an electronic sourcebook available through the Internet in electronic form (Adobe Acrobat Portable Document Format [PDF]) for use in the commissioning, recommissioning, or retrocommissioning of Army buildings. *Commissionpedia* provides an electronic sourcebook of tools, specifications, regulations, publications, case studies, and other information needed to commission, recommission, or retrocommission Army buildings.

Benefits

Commissioning helps assure that the Corps' customers receive properly functioning HVAC systems at minimal cost. Cx/ReCx can dramatically improve energy efficiencies while achieving tangible results for building occupants. A major 2004 study by Lawrence Berkeley National Laboratory (LBNL-56637) found that for new buildings, median commissioning costs were $1/sq ft with a median payback time of 4.8 years. These figures are conservative, and do not include additional benefits such as reduced change orders from early detection of problems during design and construction, and detecting and correcting causes of premature equipment breakdown. The same study found that for existing buildings the median commissioning costs for $0.27/sq ft, resulting in median whole-building energy savings of 15% and a median payback of 0.7 years.

Success Stories

CERL has provided commissioning and recommissioning assistance to facilities for the Defense Commissary Agency, Fort Buchanan, Puerto Rico, Fort Campbell, KY, Fort Hood, TX, Fort Monmouth, NJ, Fort Myer, VA, and the Pentagon. The types of facilities that have been commissioned or recommissioned include administrative and supply buildings, air traffic control tower, barracks, child development centers, commissaries, dining facility, high school, and training centers.

ERDC POC(s)

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